

# Coastal Sand Dune Geology

## MAPPING MAINE'S DYNAMIC DUNES

"Coastal sand dune systems" are sand and gravel deposits within a marine beach system, including, but not limited to, beach berms, frontal dunes, dune ridges, back dunes and other sand and gravel areas deposited by wave or wind action. Coastal sand dune systems may extend into coastal wetlands. Coastal sand dune systems include dunes that may have been artificially created, dunes that may have been altered by development activity, and dunes supported by sand fencing or stabilization structures. Coastal sand dune systems naturally migrate landward through the process of overwash. For the purposes of this definition, a small windblown accumulation of sand within a street is not considered a dune. Maine's coastal beaches and dunes are constantly changing. Erosion or accretion can reshape the beach and dunes over time so remapping is needed for resource protection and coastal development. This map series updates and supersedes the previous Coastal Sand Dune Geology Maps of 2011 (Slovinsky and Dickson, 2011) and the Beach and Dune Geology Aerial Photo series maps (Dickson, 2001). The extent of coastal sand dunes were mapped using available aerial orthoimagery, lidar (light detection and ranging) topographic data, permit reviews, and field evaluations. Erosion Hazard Area boundaries were mapped according to the existing definition using historical shoreline change data, geomorphology, FEMA flood maps, and field evidence of storm washover in dunes.

## COASTAL SAND DUNE RULES

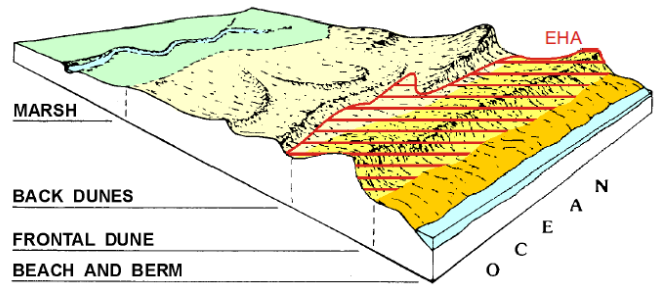
The Maine Natural Resources Protection Act (NRPA: Title 38 Section 480-D) requires that new coastal development will not unreasonably (1) interfere with the natural supply or movement of sand or gravel within or to the sand dune system; (2) increase the erosion hazard to the sand dune system; (3) cause or increase the flooding of the dunes or adjacent properties; (4) interfere with the natural flow of any surface or subsurface waters; (5) inhibit the natural transfer of soil from the terrestrial to marine or freshwater environments; (6) harm any significant wildlife habitat, threatened or endangered plant habitat, travel corridor, freshwater, estuarine or marine life; or (7) interfere with existing scenic, aesthetic, recreational, or navigational uses.

Permits are usually required for building projects located in Maine's coastal sand dune system. The Coastal Sand Dune Rules, Chapter 355, of the Maine Department of Environmental Protection clarify the criteria for obtaining a permit under NRPA (in regard to coastal sand dune systems). The rules outline classes of projects which are exempt from the requirement of obtaining a permit. For all other projects, the rules outline standards which must be met to satisfy the statutory criteria. The rules are based on the location of the project within the sand dune system.

## Additional Sources of Information


Contact the Maine Department of Environmental Protection, Bureau of Land and Water Quality, 17 State House Station, Augusta, ME 04333 for information regarding the Coastal Sand Dune Rules and the Natural Resources Protection Act.

## EXPLANATION OF MAP UNITS



**D1 Frontal dune.** The frontal dune is the area consisting of the most seaward ridge of sand and gravel and includes former frontal dune areas modified by development. Where the dune has been altered from a natural condition, the dune position may be inferred from the present beach profile, dune positions along the shore, and regional trends in dune width. The frontal dune may or may not be vegetated with dune vegetation and may consist in part or in whole of artificial fill. In areas where smaller ridges of sand are forming in front of an established dune ridge, the frontal dune may include more than one ridge. The frontal dune includes former frontal dune areas modified by development. Where the dune has been modified by structures, the dune position may be inferred from the present beach profile, dune positions along the shore, and regional trends in dune width.

**D2 Back dunes.** Back dunes consist of sand dunes and eolian sand flats that lie landward of the frontal dune or a low energy beach. Back dunes include those areas containing artificial fill over back dune sands or over wetlands adjacent to the coastal sand dune system.

 **Erosion hazard area (EHA).** Any portion of the coastal sand dune system that can reasonably be expected to become part of a coastal wetland in the next 100 years due to cumulative and collective changes in the shoreline from: (1) historical long-term erosion; (2) short-term erosion resulting from a 100-year storm; or (3) flooding in a 100-year storm after a two-foot rise in sea level, or any portion of the coastal sand dune system that is mapped as an AO flood zone by the effective FEMA Flood Insurance Rate Map, which is presumed to be located in an Erosion Hazard Area unless the applicant demonstrates based upon site-specific information, as determined by the department, that a coastal wetland will not result from either (1), (2), or (3) occurring on an applicant's lot given the expectation that an AO-Zone, particularly if located immediately behind a frontal dune, is likely to become a V-Zone after 2 feet of sea level rise in 100 years (Ch. 355, Section 3.P.).



Mapping of Maine's sand dune system is performed by the Maine Geological Survey with partial funding from the Maine Coastal Program/Maine Department of Marine Resources under the Coastal Zone Management Act of 1972 as amended, through the Office for Coastal Management/National Oceanic and Atmospheric Administration.